

SDMS US EPA REGION V -1

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DOCUMENTS.**

FIGURE 82

MULTI-MEDIA PILOT FILTER
NEPTUNE MICRO FLOC

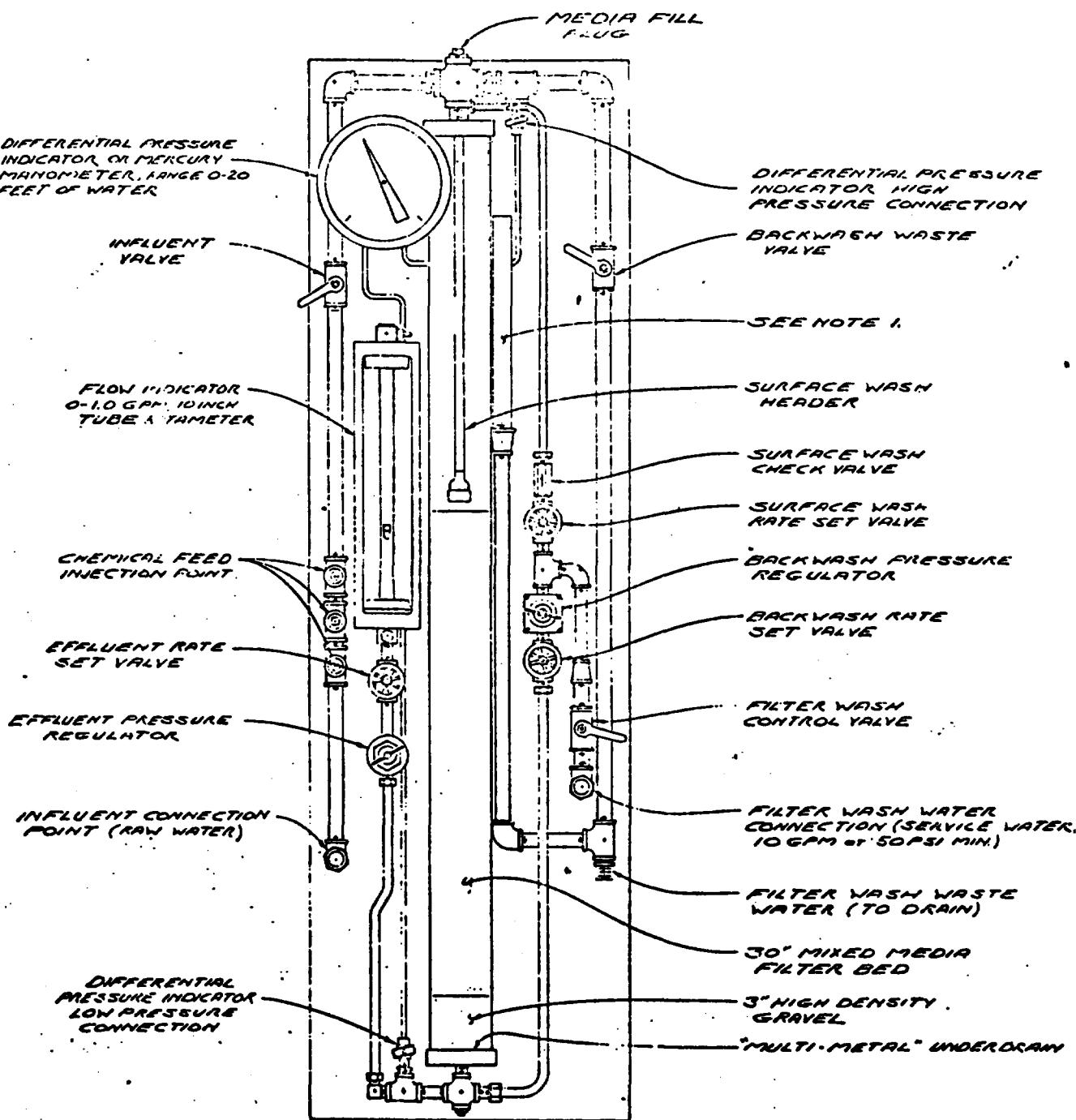
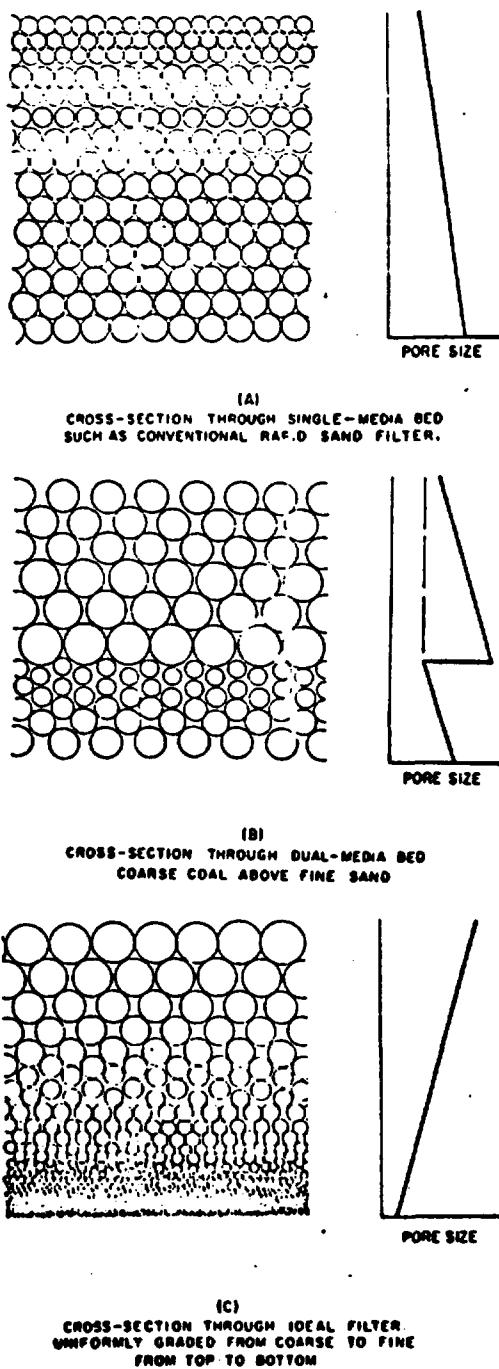


Figure 83
GRAPHICAL REPRESENTATION
OF VARIOUS MEDIA DESIGNS



Source: Culp et. al., Advanced Waste Treatment, P. 102.

TABLE 97
SOLIDS LOADING
SUMMARY OF FILTRATION DATA

| Run No. | gpm ft ² | # Solids Processed | # Solids Retained | # Solids ft ² | # Solids ft ³ | Length Run (hr) | Solids Processed Run | Solids Loading Rate hr SS Retained (hr) | Suspended Solids | | |
|---|---------------------|--------------------|-------------------|--------------------------|--------------------------|-----------------|----------------------|---|------------------|------|-----|
| | | Average Feed | Effluent | Solid Break-Through | | | | | | | |
| <u>C h e m i c a l S y s t e m E f f l u e n t:</u> | | | | | | | | | | | |
| 1 | 3 | .0828 | 0.0598 | 1.22 | 0.488 | 24.5 | 216 | 0.0024 | 16 | 13 | 20 |
| 2 | 5 | .1116 | 0.0676 | 1.38 | 0.55 | 14 | 206 | 0.0048 | 65 | 25.7 | 42 |
| 3 | 5 | .157 | 0.124 | 2.52 | 1.0 | 11.5 | 169 | 0.011 | 112 | 24.7 | 40 |
| 4 | 10 | .1279 | 0.089 | 1.82 | 0.728 | 9.5 | 279 | 0.0094 | 55 | 16.8 | 35 |
| <u>N e u t r a l i z a t i o n T a n k E f f l u e n t:</u> | | | | | | | | | | | |
| 5 | 5 | .246 | .1819 | 3.71 | 1.46 | 4 | 59 | 0.0454 | 502 | 132 | 290 |

Figure 84

Run No. I
Wet Media Filter
10/7/71
Flow 2 gpm/ft²

Differential Pressure - 131

Elapsed Time - Hours
2 4 6 8 10 12 14 16 18 20 22 24

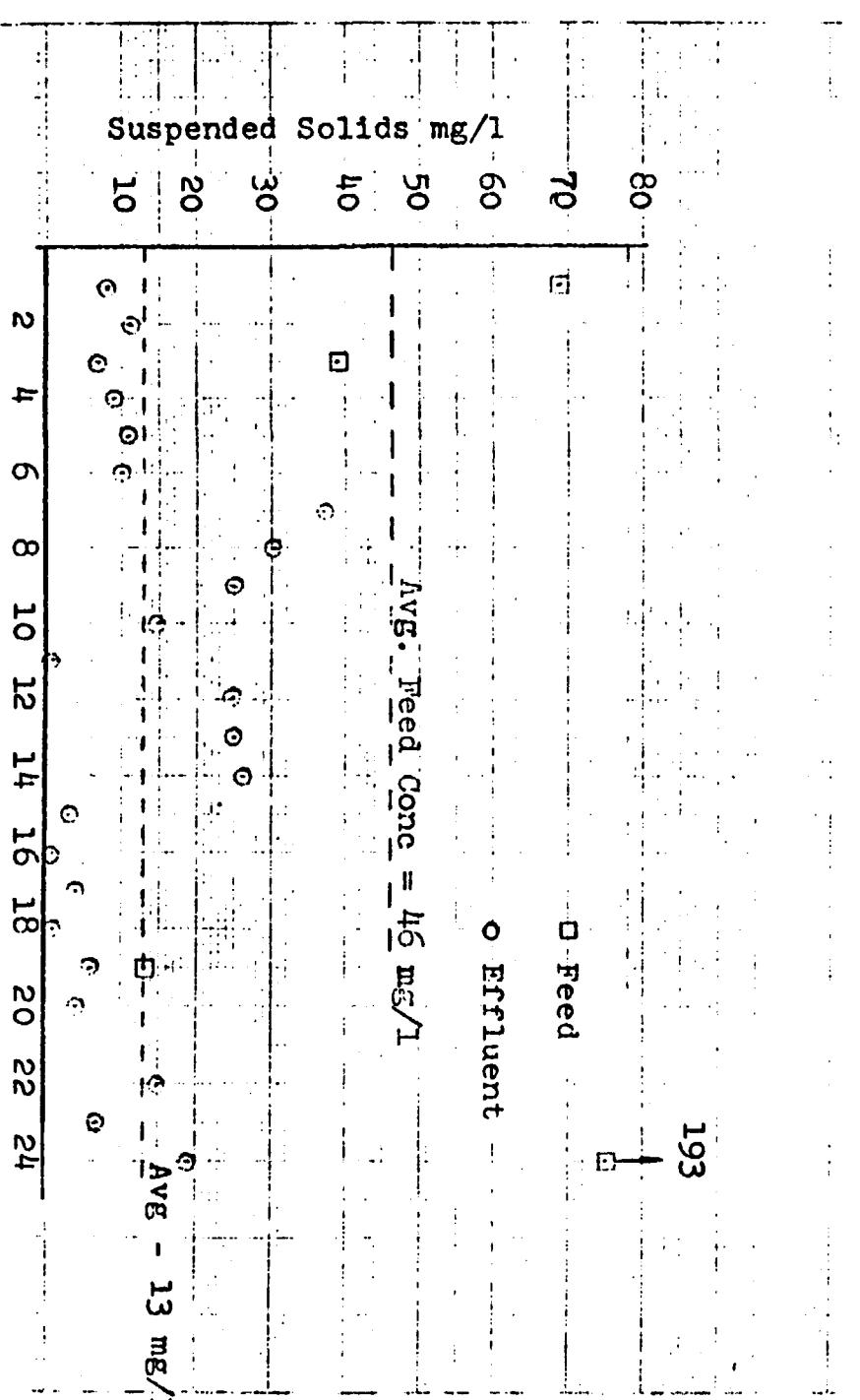


Figure 85
Run No. 2
Multi Media Filter
11/17/71
Flow 5 gpm/Ft²

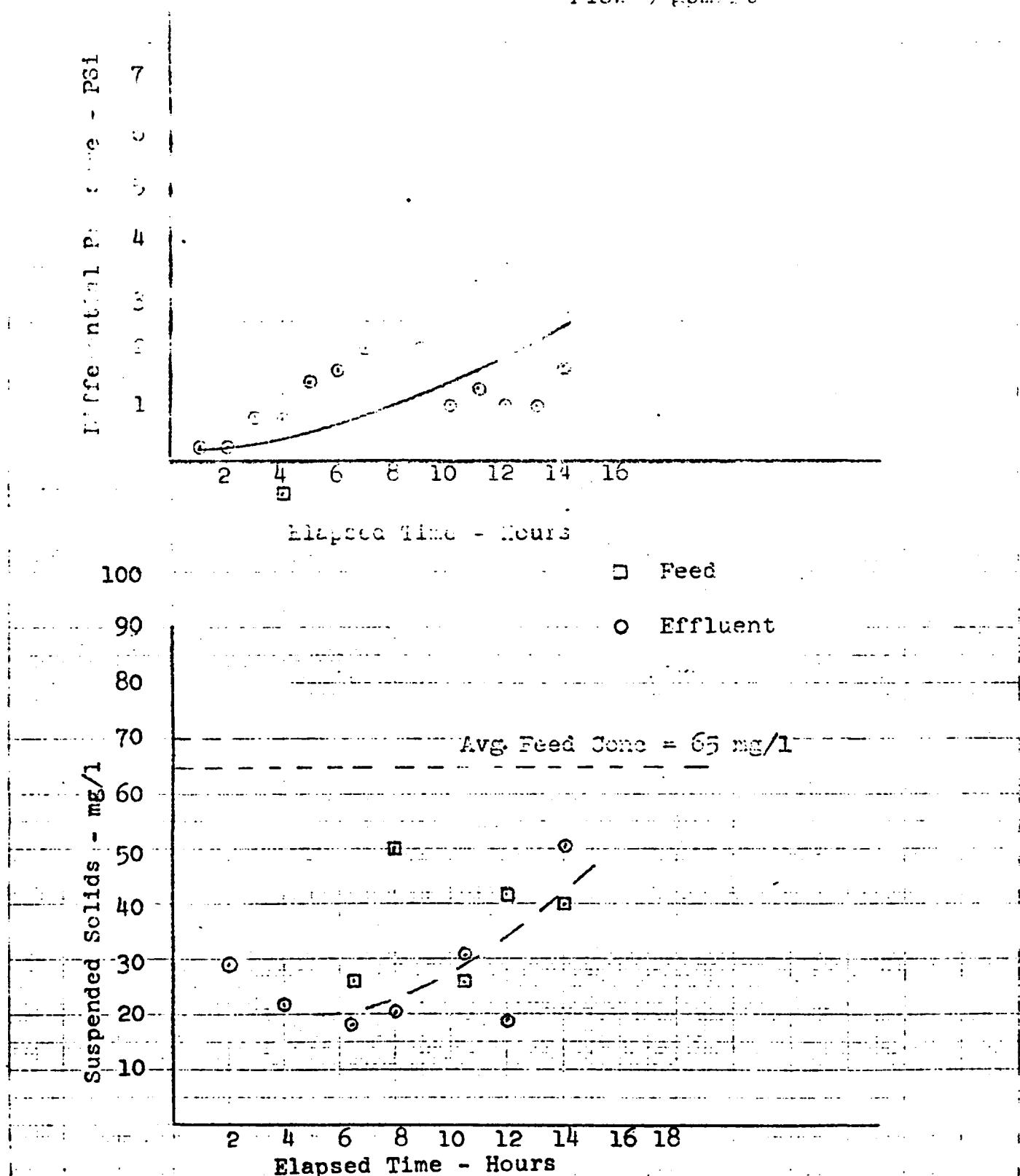


Figure 86

Run No. 3
 Multi Media Filter
 11/16/71
 Flow 5 gpm/ft²

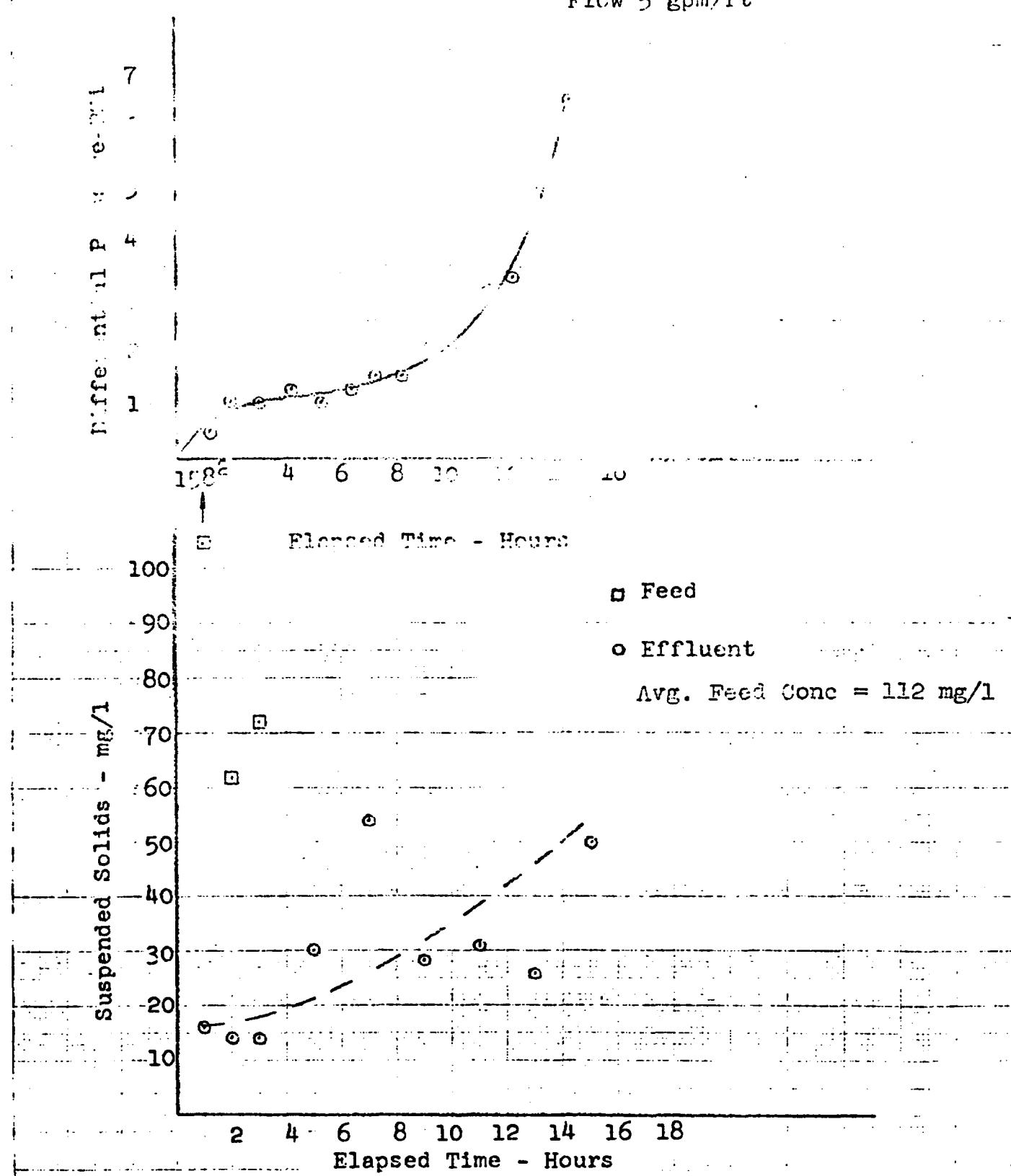


Figure 87
Run No. 4
Multi Media Filter
10/19/71
Flow 10 gpm/Ft²

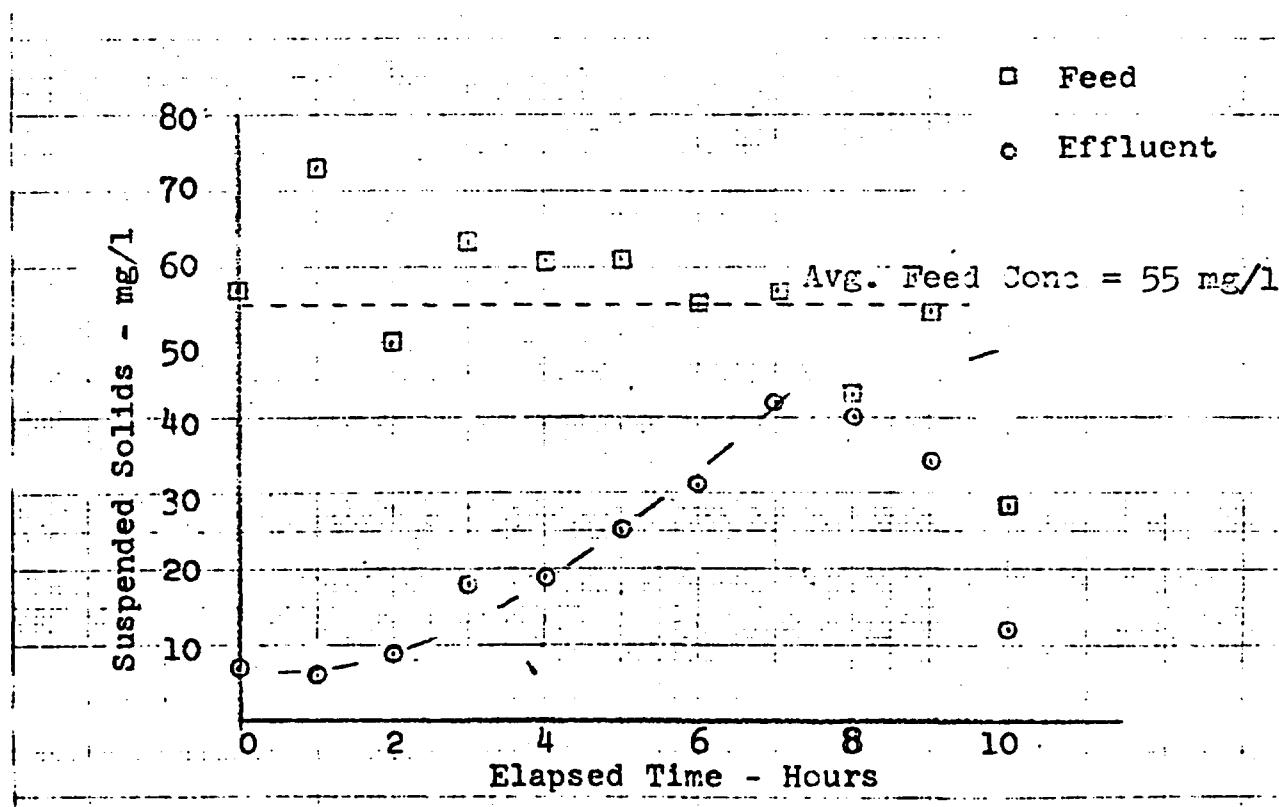
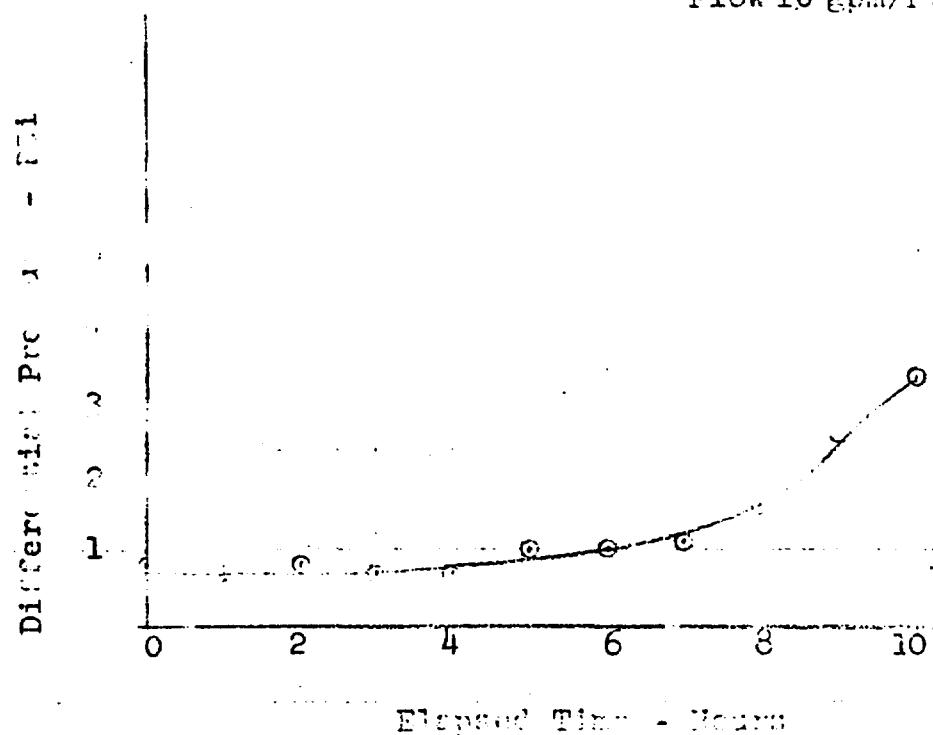


Diagram 88

Ran No. 5
Vibrating Media Filter
11/5/71
Feed from
Aeration Basin
Flow 5 gpm/Ft²
Clarifier Bypassed

Differential Pressure - psi

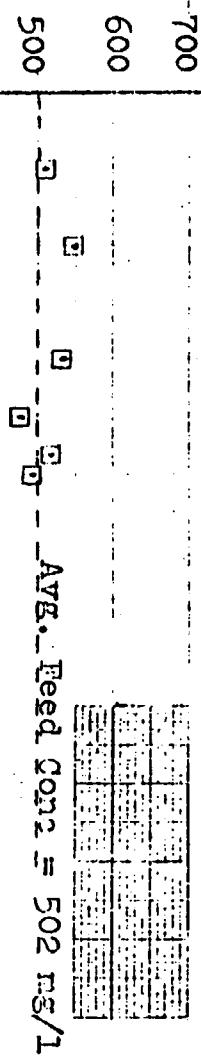
1 2 3 4 5 6 7 8

0 1 2 3 4 5 6 7 8

Elapsed Time - Hours

□ Feed

○ Effluent



Suspended Solids - mg/l

700
600
500
400
300
200
100
0

Elapsed Time - Hours

0 2 4 6 8

DISCUSSION

The volume of grit to be handled by the grit chambers was calculated from the frequency of demucking of the present settling basins and the configuration that the grit assumes in the settling basins. The basins are demucked once every 3 months. The volume the grit occupies is shown in Figure 89. When water was drained from the basins before demucking, grit could be observed to extend 18' from the influent weir crest to the walkway. From this point the grit slopes sharply downward to the edge of the sludge hopper. The area of this cross sectional surface is 105 square feet; and the width of the basin is 75 feet; therefore, using the formula for the volume of a solid ($V=h Ab$) the volume of grit collected is calculated to be 7875 cubic feet in each basin.

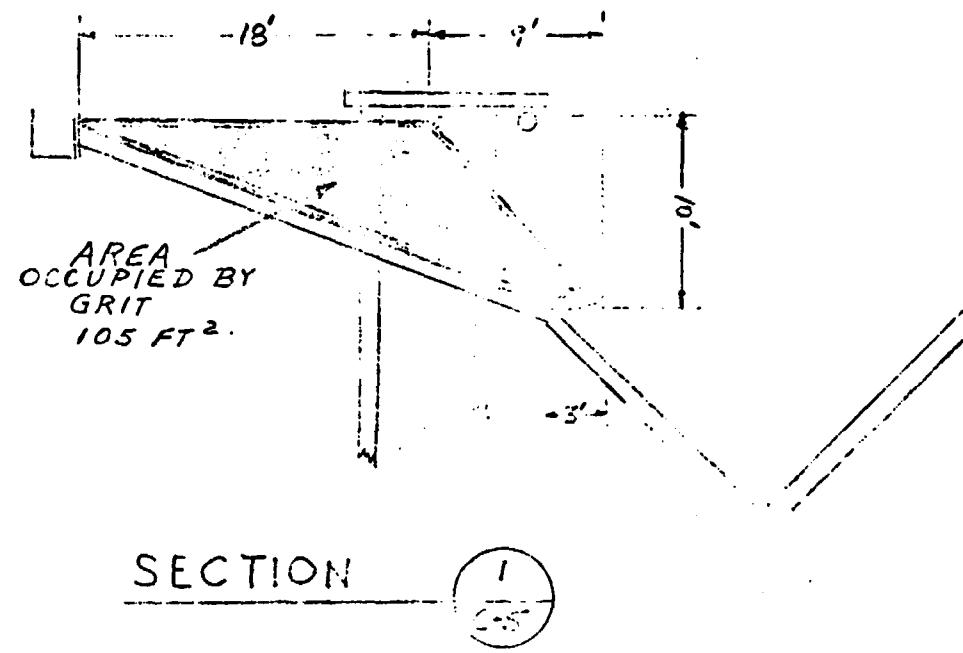
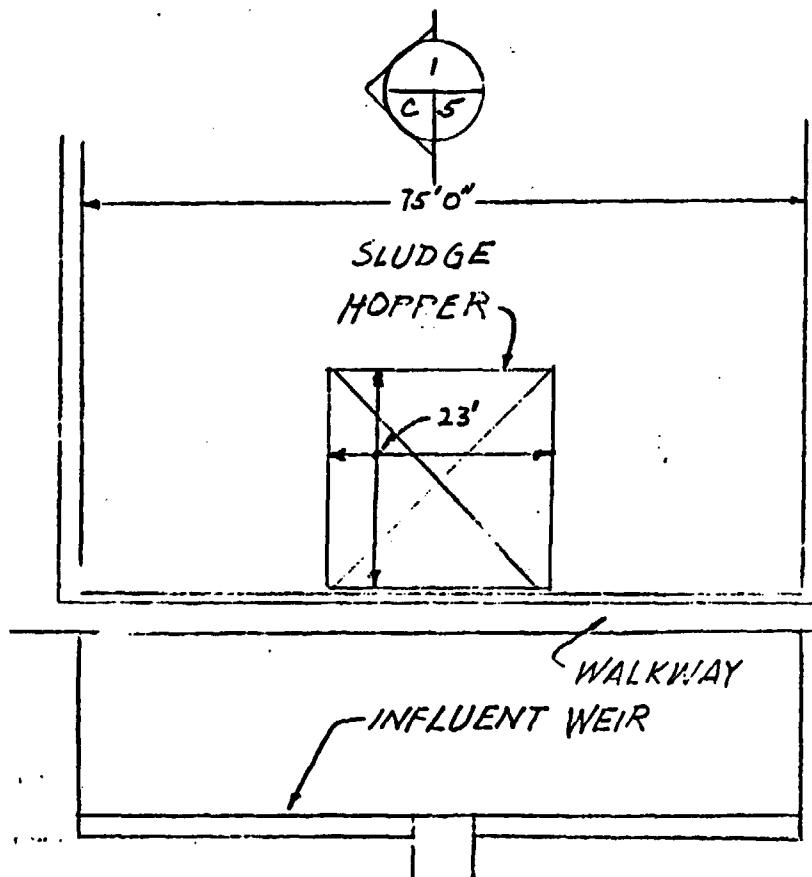
Grit is also collected in the wet well prior to the pumping operation. The surface area in the wet wells available to the grit for settling is 2122 square feet. Assuming that the grit collects to a depth of 3.5 feet in the well an additional 7427 cubic feet of grit is collected.

The two basins collect 7875 cubic feet and 7427 cubic feet are collected in the wet wells yielding total volume of 23,177 cubic feet requiring demucking. During the normal operation of the treatment plant the basins are demucked once every three months. The wetwells are not demucked on the same schedule, but for the purposes of this calculation they are assumed to be demucked on the same schedule. Thus on the average 260 cubic feet per day can be expected. The maximum collection rate is assumed to be twice the average rate or 520 cubic feet per day.

APPENDIX XIII
GRIT VOLUME CALCULATIONS

FIGURE 89

GRIT CHAMBER
VOLUME OF GRIT COLLECTED



APPENDIX XIV

STORM WATER

CALCULATIONS

STORM WATER RUNOFF-BASES FOR CALCULATION OF FIRST FLUSH

VOLUME

A. Sewer Contamination Build-Up

It is assumed that the Village of Saugat's main sewers have no appreciable contaminant build-up because of the high, consistent flow resulting in adequate scour velocities to prevent any significant build-up of deposits in the sewers. This high scour condition is not the case in larger cities where the flows are not great enough during dry weather to allow adequate scour velocities.

B. Above Ground Contamination

Contaminants present on streets, buildings, equipment and grounds will add an unknown amount of contamination to storm runoff. The contaminants washed off by the rain water would be expected to be in concentrations below the wastewater levels, thus storm runoff would act as a diluent even during the first period of the storm.

In any event, potential areas of rain water contamination are limited to the acreage bounded by the darkened lines of the attached map (note Figure 90). Areas will include 0.5 A, B, 0.5 C, D, E, F, G, H, M, N, O, Q, R, S, 0.5 T, U, V, W, X, Y and AA totaling 185 acres or 8.059 million ft² (note Table 98).

C Definition of First Flush

1. It is assumed that the major portion of any possible above ground contaminants will be carried off in the first 0.2" of rainfall.
2. Average runoff coefficient estimated to be 0.7.
3. First flush volume = V_{FF}
 $V_{FF} = \frac{185 \text{ acres} \times 43,560 \text{ ft}^2/\text{acre} \times 0.2 \text{ in.} \times 0.7}{12 \text{ in./ft}} \text{ (gal/ft}^3\text{)} -$
 $V_{FF} = 800,000 \text{ gal.}$

FIGURE 90

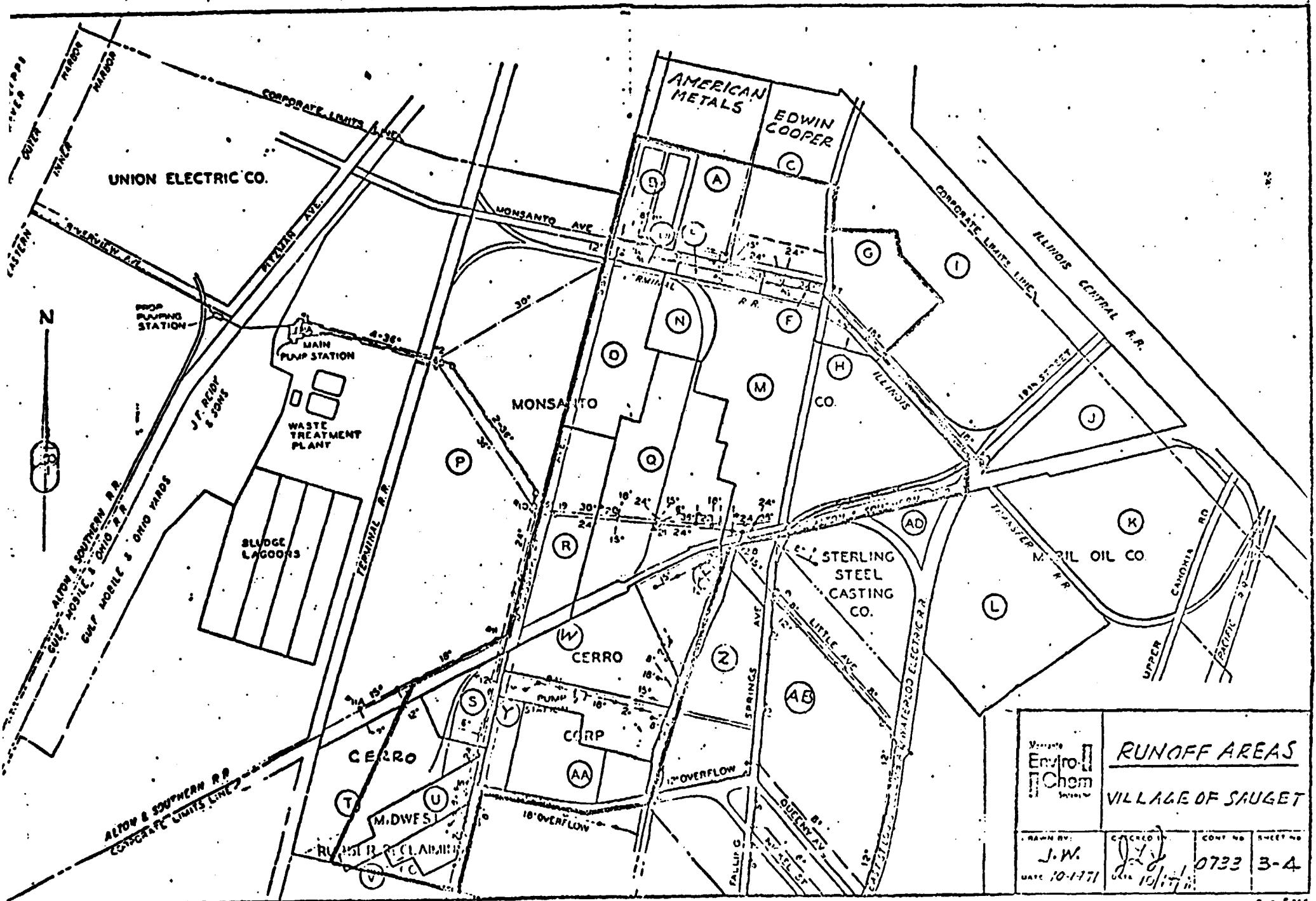


TABLE 98
RUNOFF CALCULATIONS

| <u>Section</u> | <u>Area (Acres)</u> | <u>Runoff Coefficient</u> | <u>Flow (cfs)</u> | <u>Remarks</u> |
|----------------|-------------------------|-------------------------------|-----------------------|--------------------------------------|
| A | 17 | -- | 1.2 | Balance to Seepage Pond |
| B | 7 | 0.7 | 7.7 | 0.7 cfs from D |
| C | 13.3 | 0.7 | 14.6 | 0.6 cfs from E, 0.9 cfs from F |
| D | 2.0 | 0.7 | 0 | 0.9 cfs to B, 1.0 cfs to O |
| E | 2.8 | 0.7 | 0 | 0.7 cfs to A M, & N; 0.6 cfs to C |
| F | 1.8 | 0.7 | 0 | 0.9 cfs to C & M |
| G | 10 | 0.9 | 9.8 | Parking Area |
| H | 2.0 | 0.7 | 1.9 | |
| I | -- | -- | -- | Agricultural Area |
| J | | | | From Pumping |
| K | | | 16.7 | Station, Maximum |
| L | | | | Pumping Capacity |
| M | 45 | 0.7 | 45.6 | 0.7 cfs from E; 0.9 cfs from F |
| N | 5 | 0.7 | 5.6 | 0.7 cfs from E |
| O | 14 | 0.7 | 14.7 | 1.0 cfs from D |
| P | --- | --- | --- | Agricultural Area |

Runoff Calculations (cont'd)

| <u>Section</u> | <u>Area (Acres)</u> | <u>Runoff Coefficient</u> | <u>Flow (cfs)</u> | <u>Remarks</u> |
|----------------|-------------------------|-------------------------------|-----------------------|-------------------------------|
| Q | 27 | 0.7 | 26.5 | |
| R | 14 | 0.7 | 13.7 | Minor Flooding Allowed |
| S | -- | -- | 1.0 | Maximum Outlet Capacity |
| T | -- | -- | -- | To Seepage Pond |
| U | > 8.1 | 0.7 | 7.9 | |
| V | | | | |
| W | 11.8 | 0.7 | 11.5 | |
| X | 10.0 | 0.7 | 9.8 | |
| Y | 3.0 | 0.7 | 2.9 | |
| Z | 16.7 | 0.2 | 4.6 | |
| AA | 6.0 | 0.7 | 5.9 | |
| AB | 5 | 0.7 | <u>4.9</u> | Street and Residential Runoff |
| Total | | | 206.5 | |

4. The calculated volume of all main sewers in the potential contaminant area is 510,000 gal; thus, the surface wash will provide a volume sufficient to flush the main sewer approximately 1.6 times.
5. V_{FF} = first flush storm water surge capacity.

D. Arrival Lag of First Flush

The arrival lag of the first flush water to the treatment plant will be governed by the surface runoff time and the sewer retention time.

1. It is estimated that the runoff to sewer collection boxes will flow an average of 500 feet to the main sewers at an average velocity of 2 ft/sec. (120 ft/min.)

$$\frac{500 \text{ ft}}{120 \text{ ft/min}} = 4.2 \text{ min. surface runoff time.}$$

2. Sewer retention time is based upon a full-flow velocity of 5 ft/sec. (300 ft/min.). 4-36" sewers flowing at 128.5 cfs = $\left(\frac{D^2}{4}\right)$ = sewer area = $(3)^2 = 28.3 \text{ ft}^2$, and $\frac{128.5 \text{ cfs}}{28.3 \text{ ft}^2} = 5 \text{ ft/sec.}$ Since the longest main sewer run in the potential contaminant area is 4,300 ft, the expected sewer retention time is $\frac{4300 \text{ ft}}{300 \text{ ft/min}} = 14.3 \text{ min.}$
3. Therefore, the total delay of the arrival of the first 0.2" rainfall in reaching the treatment facility would be $14.3 + 4.2 = 18.5 \text{ min.}$